

REMARKS

The Office Action of March 27, 2006 has been received and carefully reviewed. Applicants note with appreciation the indication that the drawings filed on August 16, 2004 have been accepted. By the above amendment, the specification has been amended without adding new matter. Applicants request reconsideration and allowance of the pending claims in view of the following remarks.

I. REJECTION OF CLAIMS 1-3, 9-11, 17-19, 25, 26, 31, 32, 37, 38, 44-46, 49, 50, 53, AND 54 UNDER 35 U.S.C. §103

Claims 1-3, 9-11, 17-19, 25, 26, 31, 32, 37, 38, 44-46, 49, 50, 53, and 54 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Pat. No. 6,441,342 to Hsu. Reconsideration and withdrawal of these claim rejections is respectfully requested for at least the following reasons.

The independent claims 1, 9, 17, 25, 31, 37, 44, 49, 53, and 54 of the invention were rejected as obvious in view of Hsu. Independent claim 1 recites an electric arc welder with a waveform generator controlled to create a welding process involving current flow between an electrode and a workpiece, said welding process comprising a succession of current pulse waveforms each having a starting time, a current ramp up portion with a set first lapsed time, a peak current portion with peak current and a second lapsed time, a current ramp down portion with a third lapsed time and a background current portion with a background current and a fourth lapsed time. ***The welder of claim 1 also includes a voltage sensing circuit to sense a short circuit between said electrode and said workpiece, as well as a circuit to reset said waveform generator to said starting time upon sensing a short circuit.***

This is clearly neither taught nor suggested by Hsu, whereby claims 1-3 are patentably distinct from Hsu under 35 U.S.C. §103. The Office Action cites to Figs. 1, 9, and 9B and the corresponding discussion at col. 18, line 44 through col. 20, line 39, and indicates that after a short circuit is detected in Hsu, a "clear short" routine is implemented in box 312 (Fig. 9B). As acknowledged in the Office Action, ***after the short is cleared, the waveform of Hsu is resumed at box 378 by starting the background current*** (state 13 of Hsu Fig. 9A). Thus, the system of ***Hsu does not include circuitry to reset the waveform generator to the starting time upon sensing a short circuit.*** Rather, the current is set to the background level Ib at block

378 in Hsu Fig. 9B. Moreover, there is no suggestion or motivation for modifying the teachings of Hsu to restart the waveform generator for pulse welding based on the existence or clearing or short circuit conditions. Instead, the pulse weld waveforms appear to step continuously between the states 372, 373, 375, and 378 in Figs. 9B and 10 of Hsu, with short circuit decision blocks 310 being provided only at the peak and background conditions. Importantly, shorts are cleared at 312 and the process of Hsu appears to *always* return to the background current state at block 378 in Fig. 9B, and there is no reason for changing this operation, absent impermissible hindsight based on the disclosure of the present application. In this regard, the Office Action does not address this feature of independent claim 1 or the other claims of the present application, and the proposed motivation at the top of page 3 in the Office Action is not directed to such a modification of Hsu. Therefore, claims 1-3 are patentably distinct from Hsu whereby reconsideration and withdrawal of the rejection thereof is requested under 35 U.S.C. §103.

For the same reasons, Hsu also fails to teach or suggest all the features of the other rejected independent claims 9, 17, 25, 31, 37, 44, 49, 53, and 54 and the corresponding dependent claims. In particular, independent **claim 9** recites an electric arc welder with ***a circuit to reset said waveform generator to restart said pulse waveform upon sensing a short circuit.*** Clearly, Hsu does not teach or suggest resetting a pulse waveform, but instead proceeds to clear the short and then go to the background current state, which is *not* resetting the waveform. Thus, for at least this reason, claims 9-11 are non-obvious in view of Hsu, whereby reconsideration and allowance thereof is requested under 35 U.S.C. §103. Independent **claim 17** is directed to a method of electric arc welding, including sensing a short circuit between said electrode and said workpiece, and ***resetting said waveform generator to start a next waveform upon sensing a short circuit.*** As discussed above, there is no teaching of this in Hsu and not suggestion or motivation for modifying Hsu to reset a waveform generator to start a next waveform upon sensing a short, whereby Applicants request reconsideration and withdrawal of the rejection of claims 17-19 under 35 U.S.C. §103. The welder of independent **claim 25** includes ***a reset circuit to reset said waveform generator upon sensing of a short circuit.*** For the reasons set forth above, Applicants request reconsideration and withdrawal of the rejection of claims 25 and 26 as being patentably distinct from Hsu under 35 U.S.C. §103.

In addition, Applicants request reconsideration and withdrawal of the rejections of the other independent and related dependent claims for the same reasons, including method claims 31 and 32 (independent **claim 31** recites **resetting said waveform generator upon sensing of a short circuit to immediately start a new next waveform after a sensed short circuit**), claims 37 and 38 (the welder of independent **claim 37** includes **a circuit to reset said program to said starting time of the next waveform upon sensing a short circuit**), claims 44-46 (welder of independent **claim 44** comprises **a circuit to reset said waveform to restart said pulse waveform upon sensing a short circuit**), claims 49 and 50 (independent method **claim 50** reciting **starting a next waveform upon a short circuit**, independent **claim 53** reciting an electric arc welder with **a reset circuit to start a new waveform upon sensing of a short circuit**, and independent method **claim 54** including **immediately starting a new next waveform after a sensed short circuit**).

The Office Action also refers in passing to certain dependent claims calling for sensing a short circuit only during the peak current portion or the background current portion, and goes on to state that these features do not patentably distinguish over the prior art. In addition, the Office Action asserts that the "clear short" box 312 in Hsu Fig. 9B represents a "circuit" and that the arrangement of Hsu (6,441,342) discloses detecting the short during the peak current portion or the background current, in reference to decision boxes at elements 310 following elements 373 and 378 in Hsu Fig. 9B. The Office Action then asserts on page 3 that it would have been obvious to have limited the detection to one or the other of peak and background current, stating that the motivation would be routine engineering consideration such as shortening the execution time of the Fig. 9B algorithm or simplifying this algorithm for certain welding situations by eliminating redundant short circuit checks. However, the referenced portion of Hsu at col. 18, line 44 through col. 20, line 39 acknowledges that various "exceptions" may occur "sporadically" during the weld cycle (Fig. 9; col. 18, lines 57-65), including short circuits, loss-of-arc conditions, and trigger-off conditions. Therefore, a person of ordinary skill in the art would not see the short-circuit checks of Hsu as redundant and thus would not be motivated to limit the detection to one or the other of peak and background current or any other specific portion of the weld cycle, particularly since Hsu appears to teach that short circuits may occur at any point in the pulse welding cycle. Therefore, for this additional reason, dependent claims 2, 3, 10, 11, 18,

19, 26, 32, 38, 45, 46, and 50 are further patentably distinct from Hsu and reconsideration thereof is requested under 35 U.S.C. §103.

II. REJECTION OF CLAIMS 4-8,12-16,20-24,27-30, 33-36, 39-43,47,48, 51, 52, AND 55 UNDER 35 U.S.C. §103

Claims 4-8,12-16,20-24,27-30, 33-36, 39-43,47,48, 51, 52, and 55 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu (6,441,342) as applied to claims 1-3, 9-11,17-19,25,26, 31, 32,37, 38,44-46,49, 50, 53, and 54, and further in view of U.S. Pat. No. 6,617,549 to Ihde. Reconsideration and withdrawal of these claim rejections is respectfully requested for at least the following reasons.

The Office Action states at page 3 that the only aspects of claims 4-8,12-16,20-24,27-30, 33-36, 39-43,47,48, 51, 52, and 55 to which the rejection based solely on Hsu does not apply are the provision for arrangements for clearing a short by increasing current flow, and welding with a shielding gas, and that these differences do not patentably distinguish over the prior art. In this regard, the Office Action alleges that it would have been obvious at the time of the present invention to have implemented the "clear short" routine in element 312 of Hsu (6,441,342) using an increased current as claimed for the short circuit clearing, the motivation being the teachings of Ihde (6,617,549) that it is advantageous to clear an undesired short circuit by increasing current, referring to the abstract of Ihde. Dependent claim 4 recites a short clearing circuit for increasing the current flow outside the pulse waveform upon sensing of a short before the second lapsed time. Dependent claims 12, 20, 27, 33, 39, 47, 51 also relate to this aspect of the present invention. With respect to dependent claims 4-8,12-16,20-24,27-30, 33-36, 39-43,47,48, 51, 52, and 55 generally, Applicants note that these claims depend from rejected independent claims 1, 9, 17, 25, 31, 37, 44, 49, and 54 discussed above, wherein the primary reference to Hsu fails to teach or suggest resetting or restarting a pulse welding waveform upon detecting a short circuit condition. Ihde fails to remedy this deficiency of Hsu, whereby dependent claims 4-8,12-16,20-24,27-30, 33-36, 39-43,47,48, 51, 52, and 55 are patentably distinct from the proposed combination of Hsu with Ihde and reconsideration thereof is respectfully requested under 35 U.S.C. 103 for at least this reason.

CONCLUSION

For at least the above reasons, the currently pending claims are believed to be in condition for allowance and notice thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 06-0308, LEEE200414.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP

6/19/06

/Eric Highman/
Eric Highman
Reg. No. 43,672
1100 Superior Avenue
Seventh Floor
Cleveland, Ohio 44114-2579
216-861-5582